APPENDIX K

Non Homogenous Zones in A Free Positioning Power Transfer Surface

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Attorney Docket No. 6041.P011z

Background

In some cases, devices may vary wildly, both in size and in electrical requirements. For example, a cell phone may have substantially different geometry from a notebook computer, and a PDA may differ likewise from both of these previous devices. Therefore, the geometry of a contact pad that is suitable for a cell phone or a PDA may not be suitable for a notebook, and vice versa.

In particular, a small cell phone may require densely spaced contact zones (i.e. an area with possibly a multitude of contact points, but all electrically connected together and controlled by a "single contact" node as described earlier), with a correspondingly great number of contacts. Thus, for a notebook-sized pad such dense contact spacing becomes uneconomical, due to the large total number of contact zones (potentially several hundred). For example, if a grid on a pad for a cell phone requires a one-inch center-to-center between distinct contact zones (one contact area may contain several contact points), then a desktop pad of 20 x 40 inches would require 800 contact zones, which would be prohibitively expensive. What is clearly needed is a multi-zone approach that has different contact-area densities in different zones, and the different zones may be indicated by accordingly different colors.

Furthermore, in some cases, upgrade ability by attaching a contact interface to a docking port in lieu of a power input port or a connector that was designed to allow attaching of the adapter to the device, or any other suitable connector able to insert power into a device.

Description of the Embodiment

Figure 1 shows pad 100, with zones 110 and 111. Zone 110 could be for small devices and could be indicated by, for example, yellow coloring; whereas zone 111 could have a more generic color and be intended for larger devices such as, for example, a notebook computer. The contact density of zones 110 and 111 may differ markedly, so that the two zones may contain, for example, the same number of contacts, even though their sizes are substantially different.

In some cases, although the zones may have different electrical and mechanical properties, they can be made similar, such that for the user they look as a consistent surface with only (optional) artificial markings to distinguish between the zones.

Further, in some cases zones may overlap or include other zones. For example, the entire surface may be a Notebook zone (i.e. can provide 12-20V and guaranteed to work with large contact spacing) while the right hand portion is also a PDA zone (2-6V and guaranteed to work also with smaller device spacing). In these cases, the PDA zone is included in the notebook zone and therefore a notebook can work on the entire surface.

Figure 2 shows different cell phone positions on pad 100. Cell phone position 201 straddles zones 110 and 111. Thus, if the sensing mechanism cannot recognize the cross zone positioning of the phone and deal with the differing contact densities of the two zones, it may not be able to turn on power, even though it would be technically possible.

Position 202 would be the proper placement location for the cell phone, and thus the power would be turned on. Position 203 would not allow, in many cases the cell phone to be recognized, because, due to the bigger contact area sizes, both cell phone contacts would only touch one pad area. Similarly, a notebook crossing both zones may not be turned on, even though it might be possible to do so.

The size and arrangement of zones 110 and 111 is purely arbitrary. For example, the smaller zone may be a strip along the right edge of the pad, or it may be a border around all the edges, or a strip along the left and the right edges allowing the notebook to be centered and smaller devices placed on either side

of the notebook. In other cases, the smaller zone may be at the front or at the back edge of the pad, or it may just be a circle (in the nature of a "hot spot") within the pad.

In some cases, a straddling device in a position such as position 201, if recognized properly, may still be operated, even though not completely within one zone. Figure 3 shows such an approach wherein the first matrix array switch 309 takes voltages from a power supplier lines 300 (coming from power supply, not shown here, but discussed in previous section) and in conjunction with a controller (not shown) via line 302 delivers power on sensing to zone A 310 (i.e., zone 111 of pad 100) and has return lines into the current-sensing circuitry 305 and the ground return line 303.

Off one contact node, a second switch matrix 320 is located. Matrix 320 is also controlled by a controller (not shown) via line 322 and may also have an intermediate additional regulator 324, which in some cases may be programmable by said controller. This second matrix 320 then controls zone B 330, which in the earlier example may be the small area 110 on pad 100. Switch matrix 320 may connect to current sensing circuitry 305 directly, and sense line in supply relay loop 300 through matrix 309.

It is clear that many modifications and variations of this embodiment may be made by one skilled in the art without departing from the spirit of the novel art of this disclosure. For example, power regulator 324 may connect directly to one of the supply areas 300 rather than via primary switching area 309.

In another aspect of the invention, an after market add-on may be offered, that is glued or otherwise mechanically connected to a device, and may offer in some cases multiple geometries, as to allow cross zone operation, i.e. for notebooks (not shown here). In some cases, it may rather connect to a different port than the regular power port, such as a docking port, USB on the go port, or other types of ports facilitating insertion of electrical power into a device (not shown here).

In yet another example, the surface is forcefully separated into zones. That means, even if a smaller device is placed on the large contact zone such that its contacts happen to touch two base contacts, it is intentionally not provided power, in order to it to make the behavior more consistent to the user (so the PDA will work only in the zone designated for PDA's).

Further, the attached adapter may have flexibility built in the adapter body (that is, contacts connected tightly to a flexible base or adapter body) to match the mechanical requirements of each zone.

As is discussed, the device parameters may include information such as device type and category information regarding the device contact geometry, size, spacing, and shape that will be used to enable/disable powering the device on the various zones. In some cases a device compatibility check that does not deliver power to the device if it is not compatible with the surface even if in some condition it may get power from that device. For example, when a small device placed on a surface with large contacts, in some location it may touch two contacts properly in others it will not. In this case, the system will not deliver power at all for consistency. The device geometry parameters may be received for example from the ID chip. Same concept if the surface has designated area for small devices, they will not work on the rest of the surface even if they happen to touch the contacts properly.

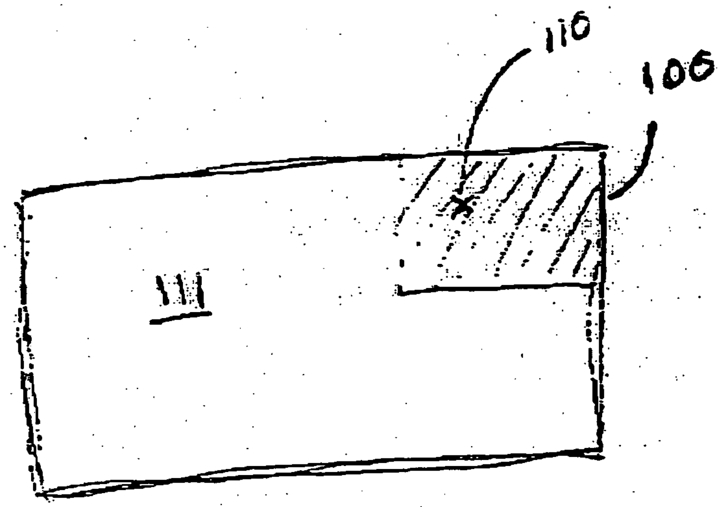

Fig. 1

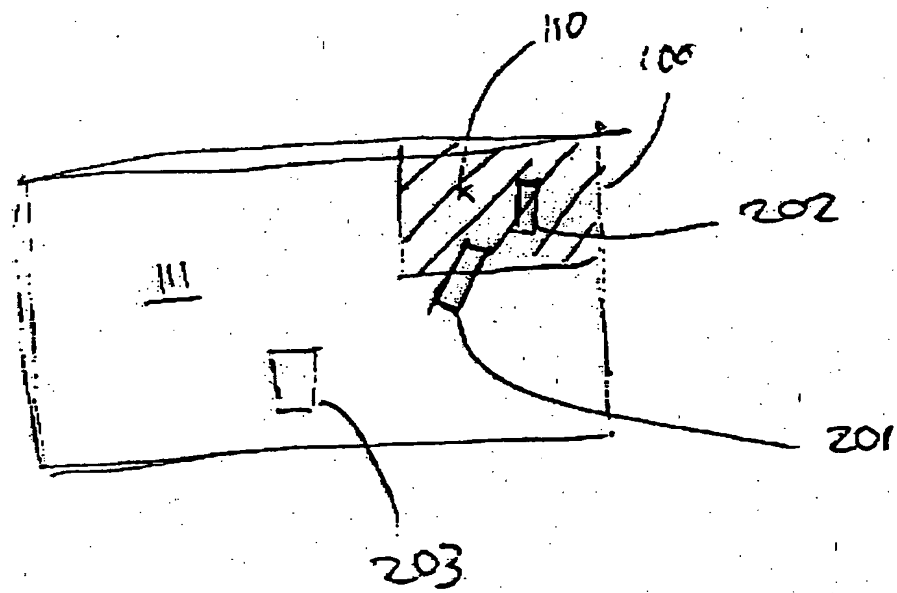

Fig.2

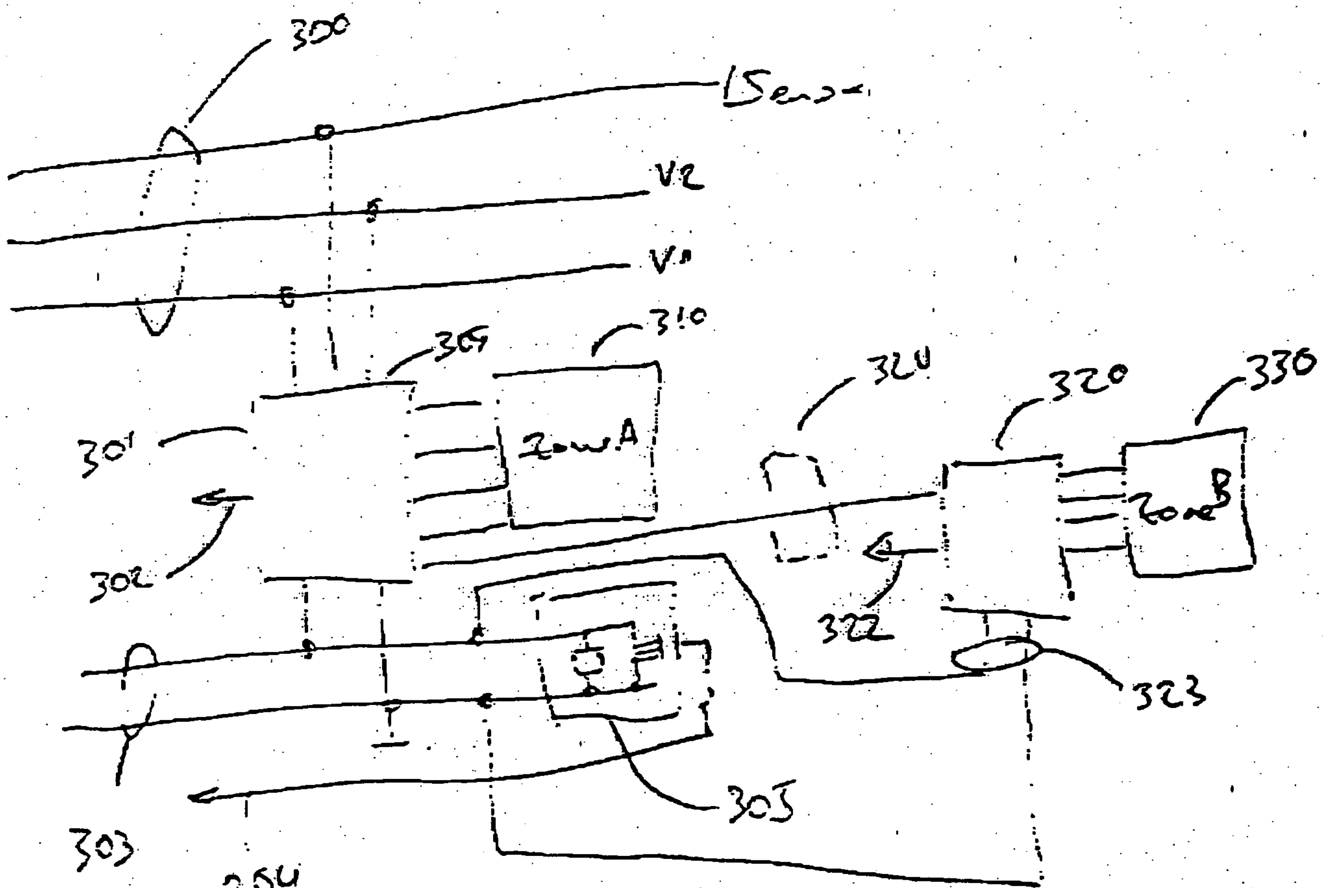
300
Sense
V2
V1
305
310
Zone A
324
320
330
301
302
Zone B
322
323
303
305
304

Fig. 3